TIN IS CRITICAL

Submission for the inclusion of Tin on the Australian Critical Minerals List

updated Aug 2026

Endorsed by Australia's leading tin producers, developers, explorers and industry associations:

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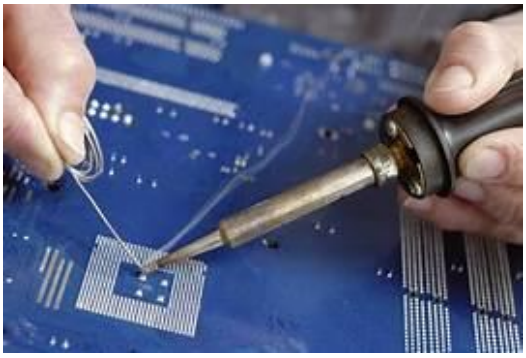
Executive Summary – Tin is not just strategic, but critical



Tin is a vital clean energy metal. Demand for tin is increasing as it is fundamental for modern life – every electrical connection needs solder, which is predominantly composed of tin. However, the supply chain for tin is stagnating and is extremely vulnerable to disruption.

Global tin supply is highly concentrated in a relatively small number of jurisdictions with over 90% of global supply produced from emerging and developing economies, strongly exposed to geopolitical, regulatory, social and operational disruption. A material proportion of global supply originates from artisanal and small-scale mining, creating additional traceability, environmental and social risks. This concentration of production combined with a history of supply disruptions, has led to a highly vulnerable global tin supply chain.

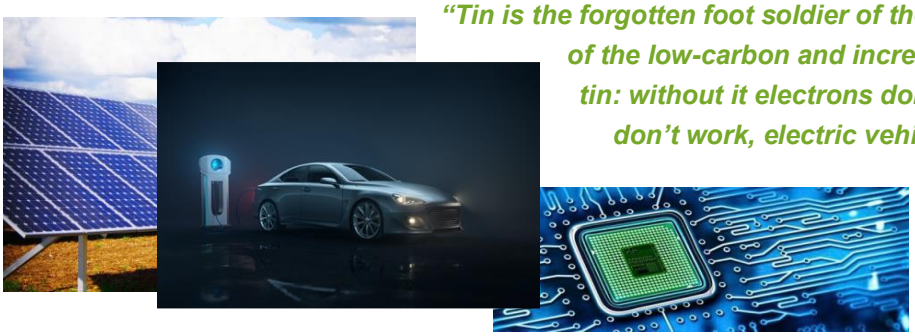
Due to depletion of resources, conflict and disruption, primary mined tin supply has not grown over the past 20 years while consumption has increased, resulting in very low global inventories. The deficit in supply has been met by an increase in recycling and drawdown of global stockpiles. Stockpiles now represent only a few weeks supply and recycling is almost at capacity, thus demand growth is outstripping supply, and a significant supply deficit is forecast moving forward. The International Tin Association forecasts demand will increase by around 88,000t between 2025 and 2035. If all current tin projects with pre-feasibility studies or better come on stream in that time, they will add less than 35,000t to global supply, meaning the deficit will be approaching 50,000t per year in 2035 and will continue to grow.[1]

Australia is the only OECD country with significant primary tin production and identified resources. With 16% of global economic resources of tin (ranked 2nd) but only 4% of global production (ranked 8th), Australia currently "*plays a relatively small but notable role in global tin supply*"[2] but has the potential to become a leading long-term global supplier of this essential metal.

Tin is critical. As a metal that is vital to the clean energy transition and digital transformation with an extremely vulnerable supply chain and a large local resource inventory, tin fulfils the criteria for designation as an Australian Critical Mineral, not just a strategic material.

Designation as a Critical Mineral would align Australia with international partners including the USA, UK, Canada, China, Japan, India and South Korea as well as maximise the benefits of our significant tin endowment to support global energy transition and deliver supply chain security to our strategic partners.

Recommendation: Addition of Tin (*Sn*) to the Australian Critical Minerals List.



"Tin is the forgotten foot soldier of the energy transition…every component of the low-carbon and increasingly data-driven economy requires tin: without it electrons don't flow, which means mobile phones don't work, electric vehicle batteries don't charge, and the Internet of Things ceases to exist."[3]

[1] International Tin Association, *Tin forecast data*, *Jul 2026 (pers comm)* with earlier data publicly available at https://www.internationaltin.org/
[2] Australian Government, *Australian Mineral Exploration Review 2025* https://www.ga.gov.au/scientific-topics/minerals/australian-mineral-exploration-review
[3] Wood Mackenzie, *Tin – the forgotten foot soldier of the energy transition* https://www.woodmac.com/news/opinion/tin--the-forgotten-foot-soldier-of-the-energy-transition

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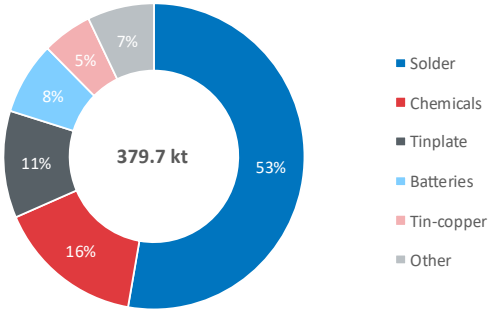
Tin is an essential metal in demand for our electrified future

Tin is a critical clean energy metal for electrification, digital technologies and advanced manufacturing. A decarbonised future of electric transportation and renewable power grids relies on circuit boards, semi-conductors and connectors, all of which require tin to provide the solder that enables the electrons to flow.

Tin (chemical symbol *Sn*, from the Latin *stannum*) is a perennially important metal. It is thought tin was first used in around 3000BC when it was added to copper to form the alloy bronze. This improved hardness and lowered the melting temperature of the alloy, so improving casting that led to the Bronze Age. Tin is favourable due to its stability, low melting point, low toxicity (hence its use in 'tin cans' for food and beverages), low oxidisation propensity and corrosion resistance.

Today, tin has many uses (see Figure 1)[4] with over 50% used in solder, making it critical for modern technology. Tin has been described as the '*glue that holds all electronic equipment together*'. As a key element in the energy transition and digital transformation, tin is increasingly in demand.

Figure 1: Global tin use by application, 2024

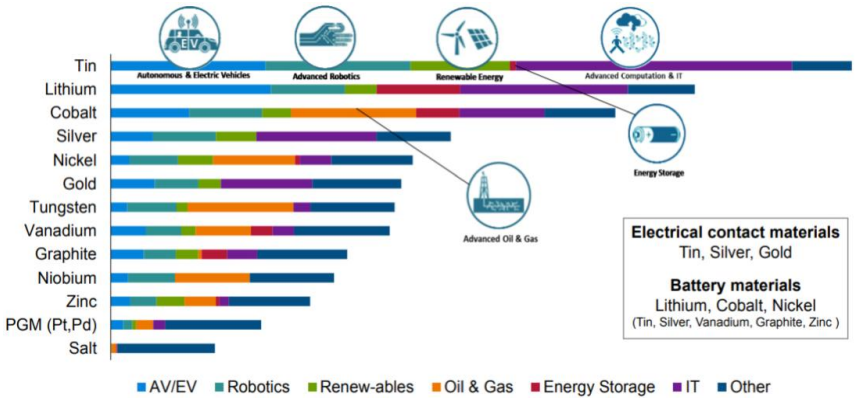


Tin is an essential component of electric vehicles and solar farms that are driving the energy transition. An average electric vehicle contains around three times as much tin as an average internal combustion engine vehicle[5], while tin is an integral component of solar ribbons that joins solar panels together, junction boxes and electronics. Tin has an important role in improving battery performance, including for the anode of the next generation of batteries, and is irreplaceable for the connectors. Perovskite solar cells, a recent improvement in solar cells, use a tin-based film.

Tin is critical for 5G, data centres, printed circuit boards and the semi-conductors enabling the digital transformation, artificial intelligence, robotics and advanced manufacturing. These critical uses account for a large part of the increasing demand for tin. More traditional uses of tin also continue to grow with the use of tin in the float glass manufacturing process that supplies the plate glass for modern energy efficient high-rise construction. Tin has increasingly many uses in chemicals, including as a stabiliser and enabling the touch screen capability of mobile phones.

Of all the key metals, tin is the one most impacted by new technology, as shown in Figure 2.[6]

Figure 2: Metals to be most impacted by new technologies



[4] International Tin Association (ITA), *Market summary data, Jul 2026 (pers comm) with earlier data publicly available at* https://www.internationaltin.org/ita-study-tin-use-in-recovery-cycle/

[5] Fastmarkets, *Tin price nears $32,000 per tonne on demand for technology and renewables, Apr 2024* https://www.fastmarkets.com/insights/tin-price-high-demand-for-technology-renewable

[6] Rio Tinto presentation (MIT); Lithium and Battery Metals Conference, 2018 https://www.riotinto.com/en/invest/presentations

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Tin has a highly vulnerable supply chain

Global tin supply is highly concentrated in a relatively small number of jurisdictions, with production exposed to geopolitical, regulatory, social and operational disruption. A material proportion of global supply also originates from artisanal and small-scale mining, creating additional traceability, environmental and social risks. This concentration, combined with a history of supply disruptions, increases the vulnerability of the global tin supply chain.

Australia, with just 4% of global tin production, is the only significant OECD tin producer.

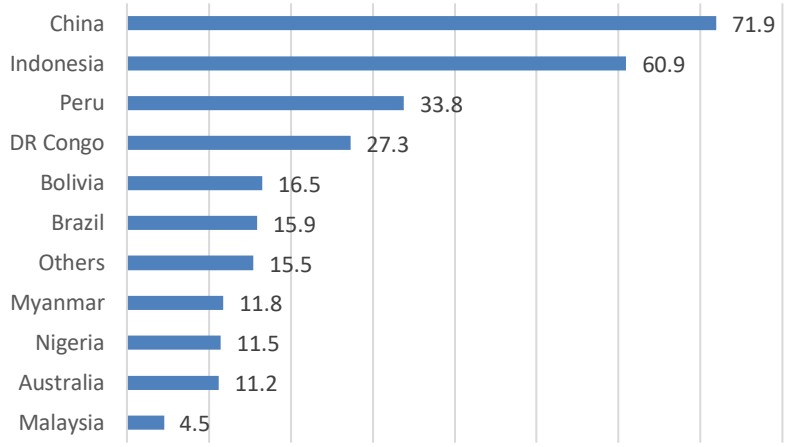


Figure 3: Global production of tin in 2025 by country (kt tin in concentrate)

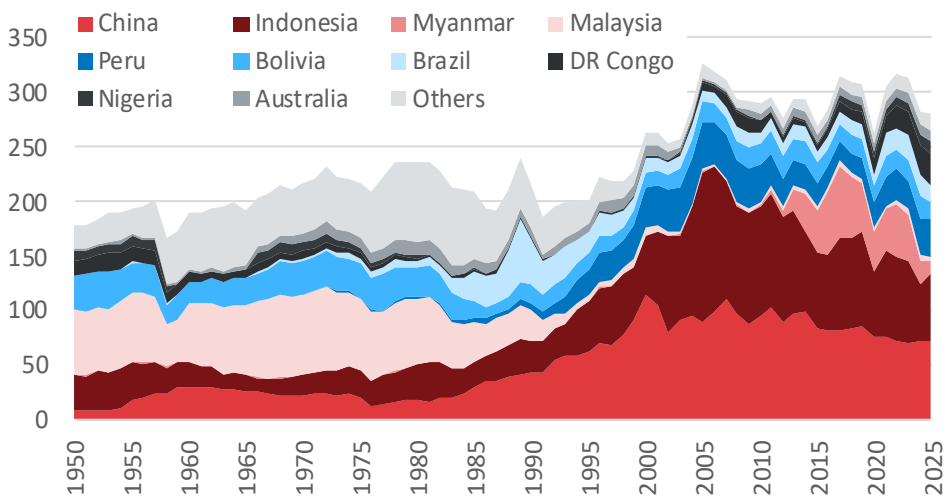
Over 60% of global tin mine production is from China, Indonesia, Peru and DRC, with the top ten global mined tin producers in 2025 shown in Figure 3.[7]

Over the past twenty years tin production has stagnated, with declining supply from Indonesia, Peru and China, only partially offset by recent supply from Myanmar, which is also now in decline, as shown in Figure 4.[8] In recent years, there have been substantial disruptions to supply, including declining feedstock and ore quality in China, delays in obtaining licences and operational difficulties with offshore dredging in Indonesia, conflict-related suspensions of mining activities in Myanmar and the DRC, and social disruptions in Peru and Bolivia. Recently, the issue of 'conflict minerals' has seen court cases raised in the EU targeting use of tin and other minerals from the DRC and Rwanda.

'Conflict minerals' and other environmental and social concerns has major manufacturers looking for new supplies of tin that are traceable, compliant and sustainable.

Further, the rate of new mines being developed is likely to continue to decline. Historically, the majority of tin mined has been from alluvial sources that were relatively easy to find and mine. Over the last 50 years, most alluvial sources have been exhausted and tin mining has been progressing toward hard rock sources. Hard rock sources are much more difficult to discover due to a much smaller or minimal surface footprint and take much longer to progress to production (generally

Figure 4: Global tin production (kt tin in concentrate) by country 1950-2025



[7]International Tin Association, *Market summary data*, *Jul 2026 (pers comm)* with earlier data publicly available at https://investingnews.com/top-tin-producing-countries/
[8]International Tin Association, *Market summary data*, *Jul 2026 (pers comm)* with earlier data publicly available at https://www.internationaltin.org/recycling/

between 7 and 20 years from initial discovery), so delaying the rate of new mines coming on stream.

Recycling of tin is challenging with limited opportunity for growth. Tin can be infinitely recycled, with an input rate of 30-35% over the last decade[9] which is similar to copper and aluminium. However, tin use is spread across a variety of sectors, and the scrap generated further down the value chain is more varied and demanding to sort and clean. The economics for collecting and recovering tin are challenging, and so recycling has only limited opportunity to grow or meet global demand.

Global demand for tin is growing as stockpiles are depleted

Due to depletion of resources, conflict and disruption, primary mined tin supply has not grown over the past 20 years while consumption has increased, resulting in very low global inventories. The deficit in supply has been met by an increase in recycling and drawdown of global stockpiles. Stockpiles now represent only a few weeks supply and the scope for recycling to close the projected supply gap is constrained by collection, recovery and economic limitations.

Demand growth for tin is outstripping supply, with a significant supply deficit forecast.

The International Tin Association forecasts demand will increase by around 88,000t between 2025 and 2035 (See Figure 5). If all current tin projects with pre-feasibility studies or better come on stream in that time, they will add less than 35,000t to global supply, meaning the deficit will be approaching 50,000t by 2035 and will continue to grow.[10]

At the same time, the price of tin is increasing (Figure 6) [11] and highly vulnerable to supply changes. As an example, in March 2025 the tin price increased 7% overnight following the closure of Bisie, the third largest tin mine globally, due to insurgent militant groups.

Figure 5: Global supply-demand of tin (kt tin in refined tin) 2021-2035

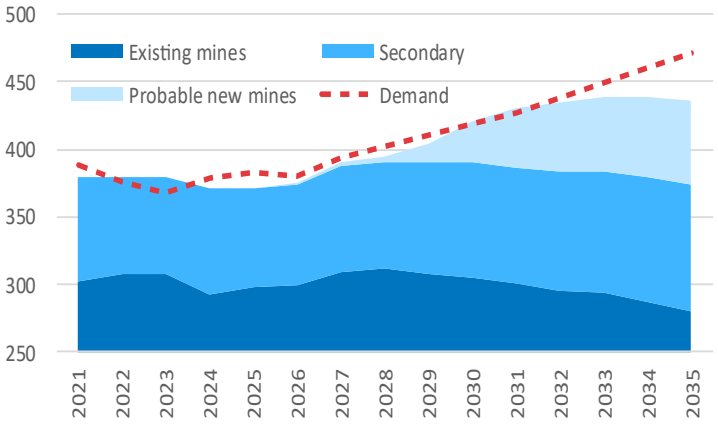
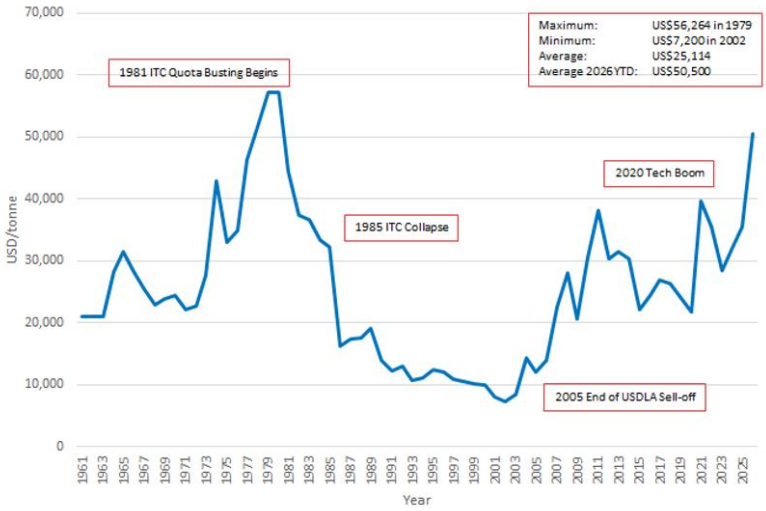


Figure 6: Average annual tin price 1960-2026



With growing global demand for tin driven by the energy transition and digital transformation, a stagnating tin mining supply with a limited pipeline of advanced new projects is predicted to create a growing deficit in the tin supply-demand balance, as shown in Figure 5.

With over 90% of tin supply produced from emerging and developing economies experiencing conflict and supply disruptions, the need for new, secure and reliant supply from an OECD location such as Australia is paramount.

[9] International Tin Association, Tin Recycling https://www.internationaltin.org/recycling/
[10] International Tin Association, *Tin forecast data*, *Jul 2026 (pers comm)* with earlier data publicly available at https://www.internationaltin.org/
[11] International Tin Association, *Market summary data*, *Jul 2026 (pers comm)* with earlier data publicly available at *Global Tin Market Outlook, November 2024* https://www.internationaltin.org/

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Australia has significant tin potential, but limited current production

Australia is the only OECD country with significant primary tin production and identified resources. With 16% of global economic resources of tin (ranked 2nd) but only 4% of global production (ranked 8th), Australia currently "*plays a relatively small but notable role in global tin supply*"[12] but has the potential to become a leading long-term global supplier of this essential mineral.

As with so many minerals, Australia is generously endowed with tin.

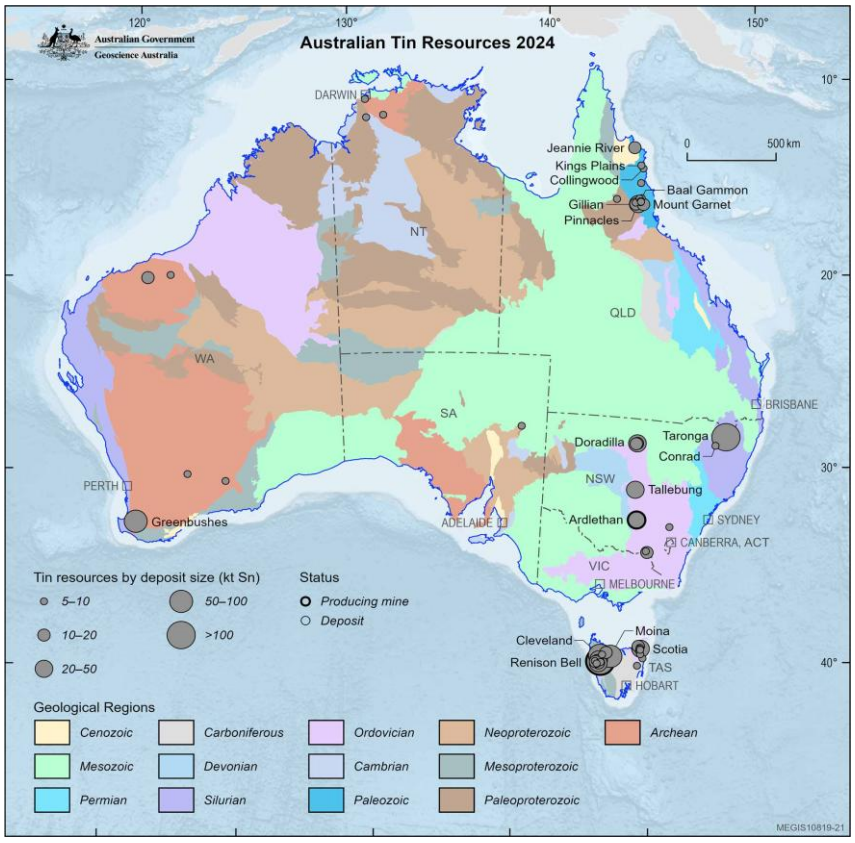
Tin was first discovered in Australia in the 1850s and Australia has a long history of tin mining. Currently there are just two operating mines - Renison in Tasmania and Ardlethan in NSW. Australia currently produces over 11,000 tonnes of tin, with an export income of $478 million[13] annually.

However, Australia has important historic and known tin resources/deposits (Figure 7)[14] including:

- **Tasmania** – Heemskirk, Cleveland, Mt Bischoff and Rossarden
- **NSW** – Emmaville, Tallebung, and Tingha
- **Queensland** - Herberton/Mount Garnet, Stanthorpe and Cooktown/Collingwood districts
- **WA** – Greenbushes and Wodgina.

Importantly, Geoscience Australia reports that Australia has 16% of global economic resources of tin (ranked 2nd) but only 4% of global production (ranked 8th). [15]

Figure 7: Australian tin deposits and operations



Tin is not just strategic, but critical

Australia, as with many countries, has developed lists of critical and strategic minerals. Critical Minerals are defined as *"essential to our modern technologies, economies and national security, and whose supply chains are vulnerable to disruption"*[16]. The Strategic Materials List is a "*watchlist"* of additional minerals that are "*important for the global transition to net zero and broader strategic applications, but their supply chains are not currently vulnerable to disruption*".[17]

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[12] Australian Government, *Australian Mineral Exploration Review 2025* https://www.ga.gov.au/scientific-topics/minerals/australian-mineral-exploration-review
[13] Australian Government https://www.ga.gov.au/aimr2025/commodity-summaries#tin-section
[14] Australian Government https://www.ga.gov.au/aimr2025/commodity-summaries#tin-section
[15] Australian Government https://www.ga.gov.au/aimr2025/commodity-summaries#tin-section
[16] Australian Government, *Critical Minerals Strategy 2023-2030* https://www.industry.gov.au/publications/critical-minerals-strategy-2023-2030
[17] Australian Government, Australia's Critical Mineral List and Strategic Materials List https://www.industry.gov.au/publications/australias-critical-minerals-list-and-strategic-materials-list

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Tin was included on the Australian Government Strategic Materials List in the announcement of the initiation of this new category in December 2023.

The question is no longer whether tin is strategically important, whether Australia has geological potential, or whether it is demanded by Australia's strategic partners. Those matters are already established. The key question is whether current evidence demonstrates sufficient supply-chain vulnerability to warrant reclassification. We submit that it does.

Tin fulfils the criteria for designation as a critical mineral. As detailed above, tin's fundamental role as a connector to allow electrons to flow in electronics makes it essential for our modern technologies. Its major uses align with Australia's critical mineral priorities and *Australia's List of Critical Technologies in the National Interest* that includes *"batteries and battery components, semi-conductors for micro-chips and solar PV, defence technologies"*.[18]

Critically, the supply chain for tin is highly vulnerable to disruption with production exposed to geopolitical, regulatory, social and operational disruption as well as traceability, environmental and social risks.

Internationally, tin is designated as a Critical Mineral in other key jurisdictions including Australia's strategic partners the USA, UK, Canada, China, Japan, India and South Korea. Given the limited availability of primary tin supply across OECD countries, Australia has the opportunity to grow its value share with our international partners by building a resilient and sustainable supply chain for priority modern technologies.

Australia has potential to be a tin global powerhouse

With our strong reputation as a secure global supplier of sustainably and ethically sourced materials, Australia has the potential to be a significant global tin producer. Many of the historic tin mining regions are currently under exploration (Figure 8) with strong potential for development.

Development of this vital material would be supported by the addition of tin to the Australian Critical Minerals List. The designation of tin as an Australian Critical Mineral would accelerate project development and production by opening the regulatory and financial benefits provided for designated critical minerals and so support Australia's strategic interests, the global energy transition and the digital transformation.

Figure 8: Exploration in a historical adit at the Taronga site in NSW

As an enabling material for modern technologies, clean energy, digital infrastructure, advanced manufacturing and defence-related supply with an extremely vulnerable supply chain, tin deserves a place on the Australian Critical Minerals List.

Recommendation: Addition of Tin (*Sn*) to the Australian Critical Minerals List.

[18] Australian Government, *List of Critical Technologies in the National Interest* https://www.industry.gov.au/publications/list-critical-technologies-national-interest